Abstract. The following species of Lepraria Ach. and Leproloma Nyl. ex Cromb. (lichenized fungi) are recognized for the Gorce Mts in Poland: Lepraria borealis Lohtander & Tønsberg (new to Poland), L. caesioalba (de Lesd.) J. R. Laundon, L. crassissima (Hue) Lettau, L. eburnea J. R. Laundon, L. elobata Tønsberg, L. incana (L.) Ach., L. jackii Tønsberg, L. lobificans Nyl., L. rigidula (de Lesd.) Tønsberg, L. diffusum J. R. Laundon s.str., L. membranaceum (Dicks.) Vain. and L. vouauxii (Hue) J. R. Laundon. The lichenicolous fungus Paranectria oropensis D. Hawksw. & Piroz. (new host: Leproloma membranaceum) is also new to Poland.

Key words: Lichenized fungi, Lepraria, Leproloma, Paranectria, lichenicolous fungus, Gorce Mts, Western Carpathians, Poland

INTRODUCTION

The lichen genera Lepraria Ach. and Leproloma Nyl. ex Cromb. are poorly known in Poland as well as in other countries in Central and Eastern Europe. They were usually noted in Polish literature as Lepraria aeruginosa (Weiss) Sm., L. inca na (L.) Ach., Leproloma membranaceum (Dicks.) Vain. and rarely as Lepraria neglecta (Nyl.) Erichsen (e.g., Kiszka 1967; 1997; Nowak 1967; Olech 1973; Kozik 1977; Cieśliński & Tobolewski 1988; Lipnicki 1990; Faltynowicz 1992; Śliwa 1998), mainly because about half of the taxa were unknown to science and only recently described (see Laundon 1989, 1992; Tønsberg 1992; Leuckert et al. 1995; Lohtander 1994, 1995). Since Lepraria and Leproloma species were formerly identified using thallus color tests (instead of TLC) as the only method of studying chemical characters, earlier records are mainly doubtful and need revision and confirmation.

This work is one of the first to present records of Lepraria and Leproloma from Poland determined by TLC analyses.

MATERIALS AND METHODS

Most of the ca 70 specimens analyzed were recognized by Czarnota (2000) as Lepraria aeruginosa s.l. and collected in Gorce National Park in 1994–1998; hence most of the localities represent a forest environment. Both authors collected additional specimens in May 1999. There are also collections from other parts of the Gorce Mts outside the park boundaries, collected mainly in open localities from agricultural landscape or rocky outcrops. All specimens were determined by TLC in solvent system C (methods according to White & James 1985). The distributions of all taxa are given in the ATPOL grid square system (Cieśliński & Faltynowicz 1993). Specimens are stored in the Herbarium of the Department of Plant Taxonomy and Nature Protection of the University of Gdańsk (UGDA-L) and in the Herbarium of the Gorce National Park (GPN).

RESULTS

The authors recognize nine species of Lepraria and three of Leproloma. Lepraria borealis
Lohtander & Tønsberg is reported for the first time for Poland.

There are only a few lichenicolous fungi on Lepraria and Leproloma noted in the literature (Kümmerling et al. 1993; Diederich & Etayo 1995). Only one lichenicolous fungus, Paranectria oropensis (Ces.) D. Hawksw. & Piroz. (Ascomycetes) growing on Leproloma membranaceum, was found in the area studied. It had not been previously reported from Poland and is marked with an asterisk in the list.

**Species**

*Lepraria borealis* Lohtander & Tønsberg (Fig. 1)

This species is reported for the first time for Poland. It seems to be quite common in mountain regions, but its distribution needs further study.

*Lepraria borealis* has a granular thallus like other members of the *Lepraria neglecta*-group, but it differs chemically and morphologically from them (see Lohtander 1994). The species was earlier known as *Lepraria* sp. A (Tønsberg 1992).

**Chemistry.** Atranorin and rangiformic acid.

**Ecology.** The species has been found on sandstone; it also known to occur on tree bark (Tønsberg 1992; Lohtander 1994).


*Lepraria caesioalba* (de Lesd.) J. R. Laundon (Fig. 1)

This species was reported for the first time for Poland by Guzow (1997), but the identification was not confirmed by TLC. The presented spe-
cimen is the first one given with the composition of lichen substances tested by TLC.

It differs from other members of the Lepraria neglecta-group found in Poland by the presence of fumarprotocetraric acid in the thallus; it is the only Lepraria species known from Poland that produces that substance.

CHEMISTRY. Fumarprotocetraric and angaradianic acids, atranorin. The specimen represents chemotype I (Leuckert et al. 1995).

ECOLOGY. The specimen occurs on moss cushions on sunny rocks.


Lepraria crassissima (Hue) Lettau (Fig. 2)

This species is known from only a few records confirmed by TLC from southern Poland, but it is probably quite common on calcareous rocks (Kukwa unpubl.).

According to Kümmerling et al. (1991), Lepraria crassissima is conspecific with L. incana (L.) Ach., because of the similar chemistry (divaricatic acid and zeorin), but after a re-examination of the type collection, Boom et al. (1994) concluded that L. crassissima is a distinct species. It differs morphologically from L. incana by its thick, stratified thallus and chemically by the constant presence of large amounts of nordivaricatic acid, which gives a C+ red reaction. The two species differ in their ecology: L. crassissima prefers calcareous rocky substrates, whereas L. incana grows on acid substrates (on tree bark, soil and other).

CHEMISTRY. Divaricatic and nordivaricatic acids, zeorin.

ECOLOGY. The species was found on calcareous rocks together with Leproloma diffusum J. R. Laundon.
**Lepraria eburnea** J. R. Laundon  
(Fig. 1)

This species was recently reported from six localities as new to Poland (Kukwa & Sagin 2001). It is similar in chemistry to *L. neglecta*, but differs in the presence of a leprose, not granular thallus.

**CHEMISTRY.** Alectorialic acid as a major substance, bartabatic and protocetraric acids in lower concentrations. All specimens represent chemotype I (Orange 1997).

**ECOLOGY.** *Lepraria eburnea* occurs on sandstone and tree bark.


**Lepraria elobata** Tønsberg  
(Fig. 1)

Recently this species has been reported from four localities in Poland (Kukwa & Owe-Larsson 2000). Detailed studies have shown that it is very common but has been overlooked or mistaken for *L. incana* in the past (Kukwa unpubl.). It differs from *L. incana* chemically and contains divaricatic acid instead of the stictic acid complex (Tønsberg 1992).

**CHEMISTRY.** Atranorin, stictic acid complex and zeorin. Lindblom (1995) reported divaricatic acid also, but in our opinion it is only contamination from *Lepraria incana*, which frequently occurs together with *L. elobata* (Kukwa unpubl.).

**ECOLOGY.** *Lepraria elobata* has a wide ecological range, being found on tree bark, decaying wood, sandstone and clayey soil.


**SPECIMENS EXAMINED.** Grid square Ge-11 – GORCE MTS, Rzeki village, in Kamienica stream valley in the vicinity of the former head office of Gorce NP, alt. 700 m, on very shaded calcareous sandstone and loamy slates, 12 July 1999, *leg. P. Czarnota* (GPN 2093, 2106, 2118); Ge-21 – GORCE MTS, Gorce NP, below Stawieniec glade, Kamienica stream valley, alt. 870 m, on calcareous sandstone, 11 June 1996, *leg. P. Czarnota* (GPN 1370/94).
Lepraria incana (L.) Ach.

(Fig. 2)

*Lepraria incana* is the commonest member of the genus in northern Poland (Kukwa unpubl.). In the Gorce Mts it was found only twice and we cannot explain its rarity here; perhaps altitude is the restrictive factor, but this suggestion needs further investigation.

The species is easily recognized by the presence of divaricatic acid (giving UV+ white reaction) and C– thallus.

**CHEMISTRY.** Divaricatic acid and zeorin.

**ECOLOGY.** In the Gorce Mts the species occurs on sandstone and tree bark. In northern Poland it is also known from soil and wood.

**SPECIMENS EXAMINED.** Grid square Ge-21 – GORCE MTS, Gorce NP, below Bieniowe glade, above Kamienica stream, vicinity of Polish Academy of Sciences station, alt. 820 m, on bark of *Picea abies*, 01 July 1999, *leg. P. Czarnota* (GPN 2109, 2111); below Bieniowe glade in Kamienica stream valley, by the trail to Gorce Kamienicki Mt., alt. 880 m, 01 July 1999, *leg. P. Czarnota* (GPN 2089); at source of Foredówka stream, below Jaworzyna Kamienicka Mt., alt. 880 m, 01 July 1999, *leg. P. Czarnota* (GPN 2089, 2097, 2080); Czerwony Groni range, below Jaworzyna Kamienicka glade, Kamienica stream valley, alt. 1060 m, on bark of *Fagus sylvatica*, 19 July 1999, *leg. P. Czarnota* (GPN 2108); at source of Forędówki stream, below Jaworzyna Kamienicka Mt., alt. 1100 m, on decaying stump, 06 Nov. 1999, *leg. P. Czarnota* (GPN 2102); vicinity of Gajówka Mikołaja, Łopuszanka stream valley, alt. 840 m, on bark and wood of *Picea abies*, 02 May 1999, *leg. M. Kukwa* (UGDA-L).

Lepraria lobificans Nyl.

(Fig. 1)

This species is a common lichen taxon in moist and shaded places. In the past it was mistaken for *Leproloma membranaceum*, but these two taxa can be differentiated easily by their chemistry.

*Lepraria lobificans* is identical in its chemistry with *L. elobata*. However, the first differs in having a distinctly stratified thallus with lobes, and soredia with long projecting hyphae, whereas the thallus of *L. elobata* is unstratified and unlobate and the soredia do not possess projecting hyphae (Tønsberg 1992).

**CHEMISTRY.** Atranorin, stictic acid complex and zeorin.

**ECOLOGY.** *Lepraria lobificans* is found on tree bark, sandstone and mosses, rarely on soil, in shaded places with fairly high moisture.

**SPECIMENS EXAMINED.** Grid square Ge-10 – GORCE MTS, Poreba Wielka village, in manorial park, alt. 520 m, on bark of *Acer pseudoplatanus*, 23 Nov. 1993, *leg. P. Czarnota* (GPN 7/94); Niedzwiadow hamlet, wayside shrine at Stramów-
Lepraria rigidula (de Lesd.) Tønsberg (Fig. 1)

Lepraria rigidula was reported for the first time in Poland from a single locality by Kümmerling et al. (1995), but it is quite common in the country (Kukwa unpubl.). The presence of nephrosteranic acid and usually long projecting hyphae on the soredia are the discriminating features (Tønsberg 1992; Leuckert et al. 1995).

CHEMISTRY. Atranorin and nephrosteranic acid.

ECOLOGY. Lepraria rigidula has been found only on bark of Fagus sylvatica in the Gorce Mts. In other parts of the country it also occurs on mosses and other tree species.

SPECIMENS EXAMINED. Grid square Ge-21 – GORCE MTS, Gorce NP, above Polanka Aniółka glade, by path in Turbacz stream valley, alt. 830 m, on bark of Fagus sylvatica, 23 May 1996, leg. P. Czarnota (GPN 1396/94); Jonkówki glade, alt. 850 m, on bark of Fagus sylvatica, 01 May 1999, leg. M. Kukwa (UGDA-L).

Leproloma diffusum J. R. Laundon var. diffusum (Fig. 2)

This taxon was first time reported for Poland from the Gorce Mts by Czarnota (2000). In the present paper the identification is corroborated by TLC. The species can be confused in the field with Leproloma membranaceum or L. vouauxii, but it differs in the presence of 4-oxypannarc acid-2-methylester detectable by TLC.

CHEMISTRY. 4-oxypannarc acid-2-methylester.

ECOLOGY. Leproloma diffusum grows on clayey soil, rocks, and mosses growing over these two substrates.

SPECIMENS EXAMINED. Grid square Ge-10 – GORCE MTS, Niedźwiedź village, by Porembianka stream, alt. 500 m, on clayey soil and epilithic mosses, 02 July 1999, leg. P. Czarnota (GPN 2105); Ge 11 – Rzeki village, in Kamienica stream, alt. 700 m, on soil, epilithic mosses and loamy slates, 12 July 1999, leg. P. Czarnota (GPN 2094, 2106); Ge 21 – GORCE MTS, Gorce NP, by blue hiking trail below Stawieniec glade, Kamienica stream valley, alt. 870 m, on calcareous sandstone, 11 June 1996, leg. P. Czarnota (GPN 1370/94); Łopuszanka river valley, by Gajówka Mikolaja, alt. 830 m, on sandstone, 01 May 1999, leg. M. Kukwa (UGDA-L).

Leproloma membranaceum (Dicks.) Vain. (Fig. 2)

This species has been reported many times from Poland, but the revision of some herbarium specimens suggests that most of the records probably belong to Lepraria lobificans or Leproloma vouauxii (Kukwa unpubl.). Leproloma membranaceum seems to be restricted to mountain areas. The presence of large amounts of pannaric acid and the markedly lobed thallus are the discriminating features (e.g., Tønsberg 1992).

CHEMISTRY. Atranorin and pannaric and roccellic acids.

ECOLOGY. In the Gorce Mts Leproloma membranaceum is a saxicolous species, as other records from Poland confirmed (Leuckert & Kümmerling 1991; Kukwa unpubl.). Outside Poland it was also found on tree bark (e.g., Tønsberg 1992).
**Leproloma vouauxii** (Hue) J. R. Laundon

(*Fig. 2*)

*Leproloma vouauxii* was reported for the first time from Poland by Laundon (1989). It is a quite common species in the country (Kukwa unpubl.). The presence of large amounts of pannaric acid-6-methylester is the discriminating feature.

**CHEMISTRY.** Pannaric acid-6-methylester with satellite substances.

**ECOLOGY.** The species occurs on tree bark and rocks.

**SPECIMENS EXAMINED.** Grid square Ge-10 – GORCE MTS, Pore˛ba Wielka village, in manorial park, alt. 520 m, on bark of *Malus domestica*, 23 Nov. 1993, leg. P. Czarnota (GP 2101); Ge-11 – GORCE MTS, Lubomierz Borki hamlet, alt. 620 m, on bark of *Fraxinus excelsior* at edge of hamlet, 12 July 1999, leg. P. Czarnota (GP 2081); Ge-20 – GORCE MTS, Gorce NP, Turbacz reserve, below Malarka in Olszowy Potok stream valley, alt. 810 m, on shaded sandstone, 26 June 1996, leg. P. Czarnota (GP 1478/94); by boundaries of Turbacz reserve, gorge of Olszowy Potok stream valley below Malarka, alt. 820 m, on bark of *Fagus sylvatica*, 26 June 1996, leg. P. Czarnota (GP 1111/94, 1329/94); Ge-21 – GORCE MTS, Gorce NP, below Stawieniec range by Kamienica stream by blue hiking trail, alt. 870 m, on sandstone, 11 June 1996, leg. P. Czarnota (GP 1369/94); Turbacz reserve, below Srednie glade, Turbacz stream valley, alt. 900 m, on bark of *Fagus sylvatica*, 30 May 1996, leg. P. Czarnota (GP 939/94).

*Paranectria oropensi* (Ces.) D. Hawksw. & Piroz. (*Fig. 1*)

This lichenicolous fungus has not been reported from Poland previously. It is also reported for the first time from the thallus of *Leproloma*. In our opinion it spread from the thallus of *Lecidella scabra* (Taylor) Hertel & Leuckert, on which it also grew, and it is probably facultatively parasitic on *Leproloma membranaceum*. The collection well fits the description given by Hawksworth (1983).

**ECOLOGY.** On thalli of *Lecidella scabra* and *Leproloma membranaceum*.

**SPECIMEN EXAMINED.** Grid square Ge-23 – GORCE MTS, Ochotnica Dolna, Michałki hamlet above main road, alt. 430 m, on *Lecidella scabra* and *Leproloma membranaceum* on shaded, slightly calcareous sandstone, 05 Aug. 1999, leg. P. Czarnota (GP 2210).

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